WE CLAIM:

1. A method of locating mobile devices, the method comprising the steps of:

(a) locating a first mobile device by implementing the steps of

(a1) determining times of arrival of a signal that originated from the first mobile device at each of at least three measurement units, and

(a2) computing a location of the first mobile device based on the times of arrival determined in step (a1); and

(b) locating a second mobile device by implementing the steps of

(b1) determining times of arrival of signals that originated from each of at least three base stations at the second mobile device,

(b2) determining times of arrival of the signals that originated from each of the at least three base stations at the measurement units, and

(b3) computing a location of the second mobile device based on the times of arrival determined in step (b1) and the times of arrival determined in step (b2).

2. The method of claim 1, wherein the second mobile device is capable of operating in a downlink mode, and the first mobile device is not capable of operating in a downlink mode.

3. A method of locating a mobile device, the method comprising the steps of:

(a) determining times of arrival of a signal that originated from the mobile device at each of at least two measurement units;

(b) determining times of arrival of signals that originated from each of at least two base stations at the mobile device;

(c) determining times of arrival of the signals that originated from each of the at least two base stations at the measurement units; and

(d) computing a location of the mobile device based on the times of arrival determined in the steps (a), (b), and (c).

4. The method of claim 3, wherein the computing step comprises the steps of:

defining a first hyperbola based on the times of arrival determined in step (a);

defining a second hyperbola based on the times of arrival determined in steps (b) and (c); and

locating an intersection of the first hyperbola and the second hyperbola.

5. A system for determining the location of a mobile device in either an uplink mode or a downlink mode, the system comprising:

an uplink processor that implements an uplink location algorithm;

a downlink processor that implements a downlink location algorithm;

at least three base stations, located at a known locations, that can communicate with the mobile device; and

at least three measurement units,

wherein, in the uplink mode, (a) each of the measurement units determines a time of arrival of a signal that originated from the mobile device and reports the determined time of arrival to the uplink processor, and (b) the uplink processor determines the location of the mobile device using the uplink location algorithm based on the times of arrival reported to the uplink processor by the measurement units, and

wherein, in the downlink mode, (a) the mobile device determines times of arrival of signals arriving from each of the at least three base stations and reports the determined times of arrival to the downlink processor, (b) the measurement units collectively determine a time of arrival of signals that originated from each of the at least three base stations and report the determined times of arrival to the downlink processor, and (c) the downlink processor determines the location of the mobile device using the downlink location algorithm based on the times of arrival reported to the downlink processor by the mobile device and by the measurement units.

6. The system of claim 5, wherein the uplink processor and the downlink processor are implemented in an integrated device.

7. The system of claim 5, wherein the uplink processor and the downlink processor are implemented in discrete devices.

8. The system of claim 5, wherein each of the measurement units includes a dual mode uplink/downlink receiver.

9. The system of claim 5, wherein each of the measurement units includes an uplink receiver and a downlink receiver that is distinct from the uplink receiver.

10. The system of claim 5, wherein each of the measurement units determines times of arrival for at least two different communication protocols.

11. The system of claim 10, wherein the at least two different communication protocols includes time division multiple access (TDMA) and global system for mobile communication (GSM) systems.

12. An apparatus for use in a communication system that includes a mobile device, a plurality of base stations located at a known locations, an uplink processor, and a downlink processor, the apparatus comprising:

a receiver that (a) notes a time of arrival of a first signal arriving from the mobile device, and forwards the noted time of arrival of the first signal to the uplink processor, and (b) notes a time of arrival of a second

signal arriving from the base station, and forwards the noted time of arrival of the second signal to the downlink processor.

13. The apparatus of claim 12, wherein the receiver comprises a first receiver that notes the time of arrival of the first signal and a second receiver that notes the time of arrival of the second signal, and wherein the first receiver is physically discrete from the second receiver.

14. The apparatus of claim 12, wherein the receiver comprises a first receiver that notes the time of arrival of the first signal and a second receiver that notes the time of arrival of the second signal, and wherein the first receiver is integrated together with the second receiver.

15. The apparatus of claim 12, wherein the first signal comprises a random access channel (RACH) signal, and the second signal comprises a broadcast control channel (BCCH) signal.

16. The apparatus of claim 12, wherein the receiver determines times of arrival for at least two different communication protocols.

17. The apparatus of claim 16, wherein the at least two different communication protocols includes time division multiple access (TDMA) and global system for mobile communication (GSM) systems.